

1 WHAT IS CLAIMED IS:

- 1 1. A method for interactively viewing and editing a digital image on a  
2 computer system comprising the steps of:  
3 storing an archival digital image in the computer system;  
4 maintaining in the computer system a state list, characterizing a sequence of  
5 image-editing operations to be applied to the archival digital image in order to generate a  
6 current edited rendition of the digital image;  
7 maintaining in the computer system a set of viewing data, characterizing the  
8 resolution, offset and extent at which to view the current edited rendition of the digital image;  
9 maintaining in the computer system a cache of image tiles comprising portions  
10 of views of edited renditions of the archival digital image; and thereafter  
11 updating, in response to image-viewing and image-editing instructions, the  
12 viewing data and the state list accordingly, and  
13 assembling in the image tile cache, by inductive image generation and in  
14 response to image-viewing and image-editing instructions, a set of image tiles sufficient to  
15 generate the current view of the current edited rendition of the archival digital image.
- 1 2. The method of claim 1 wherein said inductive image generation, for  
2 each tile in the set of image tiles, comprises:  
3 a) locking the tile in the tile cache when it is ascertained that the tile is in  
4 the tile cache;  
5 b) generating the tile from the image file, copying the generated tile into  
6 the tile cache, and locking the copied tile in the tile cache when it is ascertained that a current  
7 image state is an initial unedited state; and  
8 c1) ascertaining, when the tile is not in the tile cache or when the current  
9 image state is not in the initial unedited state, a set of supplier tiles in a prior state sufficient  
10 so that the tile can be generated from the set of supplier tiles by application of the image-  
11 viewing and image-editing instructions, and  
12 c2) assembling the set of supplier tiles, and  
13 c3) applying the image-viewing and image-editing instructions to the set of  
14 supplier tiles so as to generate the tile and copying the generated tile into the tile cache, and  
15 locking the copied tile in the tile cache.

1                    3.        The method of claim 2 wherein the supplier tiles in the prior state are  
2 assembled, for each tile in the set of supplier tiles, by:

3                    a)        locking the tile in the tile cache when it is ascertained that the tile is in  
4 the tile cache;

5                    b)        generating the tile from the image file, copying the generated tile into  
6 the tile cache, and locking the copied tile in the tile cache when it is ascertained that a current  
7 image state is an initial unedited state; and

8                    c1)        ascertaining, when the tile is not in the tile cache or when the current  
9 image state is not in the initial unedited state, a second set of supplier tiles in a prior state  
10 sufficient so that the tile can be generated from the second set of supplier tiles by application  
11 of the image-viewing and image-editing instructions of the prior state, and

12                    c2)        assembling the second set of supplier tiles, and

13                    c3)        applying the image-viewing and image-editing instructions of the prior  
14 state to the second set of supplier tiles so as to generate the tile and copying the generated tile  
15 into the tile cache, and locking the copied tile in the tile cache.

1                    4.        The method of claim 2 wherein assembling the set of supplier tiles of a  
2 tile in the set of image tiles comprises:

3                    a)        ascertaining the region in the prior state from which the tile in the set  
4 of image tiles is generated, and

5                    b)        ascertaining the set of prior-state tiles intersecting the region, and

6                    c)        assembling all the supplier tiles in the set.

1                    5.        The method of claim 4 wherein assembling the set of supplier tiles of a  
2 tile in the set of supplier tiles comprises:

3                    a)        ascertaining the region in the prior state from which the tile in the set  
4 of supplier tiles is generated, and

5                    b)        ascertaining the set of prior-state tiles intersecting the region, and

6                    c)        assembling all the supplier tiles in the set.

1                    6.        The method of claim 1 wherein the image-viewing instructions specify  
2 the extent of the view of the current edited rendition of the digital image by explicitly  
3 identifying the tiles to be viewed.

1                   7.       The method of claim 1 wherein the image-viewing instructions specify  
2   the extent of the view of the current edited rendition of the digital image by identifying the  
3   region to be viewed, whereupon the addresses of all tiles intersecting the region are  
4   computed.

1                   8.       The method of claim 1 additionally comprising copying the set of  
2   image tiles sufficient to generate the current view of the current edited rendition of the  
3   archival digital image into the computer system's video display buffer so as to generate the  
4   current view of the edited rendition of the archival digital image.

1                   9.       A computer system for interactively viewing and editing a digital  
2   image comprising:

3                   an electronic digital-data storage device, operative to hold a plurality of  
4   archival digital images;

5                   a state list, characterizing a sequence of image-editing operations to be applied  
6   to a given archival digital image in order to generate a current edited rendition of the digital  
7   image;

8                   a set of viewing data, characterizing the resolution, offset and extent at which  
9   to view the current edited rendition of the given digital image;

10                  a cache of image tiles comprising portions of views of edited renditions of the  
11   archival digital image;

12                  a video digital display device;

13                  a digital video memory buffer, containing digital data displayed by the video  
14   digital display device;

15                  a user-input device;

16                  a user-input module, operative to receive signals from the user-input device  
17   and translate them into image-viewing and image-editing instructions; and

18                  an application module, operative,

19                  to receive image-viewing and image-editing instructions from the user-input  
20   module, and

21                  to update the viewing data and the state list in response to the image-viewing  
22   and image-editing instructions, and

23 to assemble in the system's tile cache, by inductive image generation and in  
 24 response to the image-viewing and image-editing instructions, a set of image tiles sufficient  
 25 to generate the current view of the current edited rendition of the archival digital image, and  
 26 to copy the set of image tiles sufficient to generate the current view of the  
 27 current edited rendition of the archival digital image into the computer system's video display  
 28 buffer so as to generate the current view of the edited rendition of the archival digital image.

1 10. The computer system of claim 9 wherein the computer system  
 2 comprises a plurality of computers connected by a network.

1 11. The computer system of claim 10 wherein the network is the Internet.

1 12. The computer system of claim 10 wherein  
 2 the electronic digital-data storage device, the state list, the set of viewing data,  
 3 and the cache of image tiles reside in a first server computer, and wherein  
 4 the video digital display device, the digital video memory buffer, the user-  
 5 input devices, and the user-input module reside in a second client computer, and wherein  
 6 the application module is partitioned into a server application submodule  
 7 resident in the server computer and a client application submodule resident in the client  
 8 computer.

1 13. The computer system of claim 12 wherein the client application  
 2 submodule is operative:  
 3 to receive image-viewing and image-editing instructions from the user-input  
 4 module, and  
 5 to transmit the image-viewing and image-editing instructions to the server  
 6 application submodule.

1 14. The computer system of claim 12 wherein the server application  
 2 submodule is operative:  
 3 to receive image-viewing and image-editing instructions from the client  
 4 application submodule, and  
 5 to update the viewing data and the state list accordingly, and  
 6 to assemble in the tile cache, by inductive image generation and in response to  
 7 image-viewing and image-editing instructions, a set of image tiles sufficient to generate the  
 8 current view of the current edited rendition of the archival digital image, and

to transmit the set of image tiles to the client application submodule.

15. The computer system of claim 12 wherein the client application submodule is operative:

to receive image tiles sufficient to generate the current view of the current edited rendition of the archival digital image transmitted from the server application submodule, and

to copy the set of image tiles sufficient to generate the current view of the current edited rendition of the archival digital image into the computer system's video display buffer so as to generate the current view of the edited rendition of the archival digital image.

16. The computer system of claim 12 additionally comprising a second cache of image tiles residing in the client computer.